

**WHAT IS CLAIMED IS:**

2        1. A microfluidic device for assaying a liquid biological sample of 20 $\mu$ L or  
less comprising:

4            (a) an inlet port for receiving said sample;  
6            (b) a capillary passageway in fluid communication with said inlet port;  
8            (c) an inlet chamber in fluid communication with the capillary passageway of  
(b), thereby permitting said sample to flow into said inlet chamber, said inlet chamber  
10          containing means for uniformly distributing said sample across said chamber and,  
displacing air from said chamber; and  
12          (d) at least one vent passageway for removing air displaced by said liquid  
sample.

12        2. A microfluidic device of Claim 1 wherein said means for uniformly  
14          distributing said sample is at least one groove extending across said inlet chamber.

16        3. A microfluidic device of Claim 1 wherein said means for uniformly  
distributing said sample is at least one weir extending across said inlet chamber.

18        4. A microfluidic device of Claim 2 or 3 wherein said at least one groove or  
20          at least one weir contains wedge-shaped cutouts to facilitate uniform flow of said  
sample.

22        5. A microfluidic device of Claim 1 wherein said means for uniformly  
24          distributing said sample is a microstructure comprising an array of posts disposed across  
said inlet chamber.

26        6. A microfluidic device of Claim 5 wherein said posts contain wedge-  
28          shaped cutouts to facilitate uniform flow of said sample.

30        7. A microfluidic device of Claim 1 wherein said inlet port is tapered to  
engage the corresponding shape of a pipette for depositing said sample

32        8. A microfluidic device of Claim 1 further comprising an blood anti-  
34          coagulant deposited in said inlet chamber.

2        9.    A microfluidic device of Claim 1 further comprising an overflow chamber  
3    in fluid communication with said inlet chamber, said overflow chamber for receiving  
4    said sample in excess of the amount needed to fill said inlet chamber.

6        10.   A microfluidic device of Claim 9 wherein said overflow chamber contains  
7    an indicator to detect the presence of excess of said sample.

8        11.   A method of supplying liquid to a microfluidic device having an inlet port  
9    in fluid communication with an inlet chamber via a capillary passageway, said method  
10   comprising.  
11        (a)   introducing a portion of said liquid into said inlet port;  
12        (b)   transferring by positive pressure or capillary forces said liquid portion of  
13        (a) to said inlet chamber via said capillary passageway;  
14        (c)   distributing said liquid portion of (a) uniformly across said inlet chamber  
15        and purging air from said chamber completely.

18        12.   A method of Claim 11 wherein excess of said sample is diverted to an  
19    overflow chamber after said inlet chamber is filled.

20        13.   A method of Claim 12 wherein the presence of said excess is detected by  
21    an indicator in said overflow chamber.